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ABSTRACT

The potential of geography in qualifying college students for the environmental job market is explored. To provide information regarding the best combination of factors for job success, the background and training of graduates of the environmental studies program at Southern Illinois University at Edwardsville were examined. The program featured two plans of study for students--a social science option and a physical science option. Students were required to sample courses in each option and to prepare final research papers in their elected specialty. Data were collected for all students regarding background characteristics, undergraduate majors, composition of faculty committee members, geographic specialties of faculty, and employment of students upon completion of the program. Analysis of data indicated that of students completing the program over three years, over 75% were physical scientists, although admittance to the program was regulated at the beginning of the program so that students were roughly balanced between social and physical science majors. Findings indicated further that four of the six teachers of the core courses were physical resource specialists. Also, all jobs held by graduates (of which 53% were in private industry and 47% in government) were related to their graduate environmental education training. Based on these findings, the following recommendations were offered regarding an environmental studies graduate curriculum: (1) physical geography and other physical sciences should have a major input, (2) related disciplines should be included to develop students' specialties, and (3) the curriculum should be oriented toward opportunities in the private sector, as well as in government. (DB)

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A Geography Program for Environmental Jobs

by

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ABSTRACT

A Geography Program for Environmental Jobs

Geography, by its nature, is an ideal discipline for teaching environmental studies. How best can a geography program be tailored to qualify students for the environmental job market?

The background and training of graduates of a four-year old environmental studies program at Southern Illinois University at Edwardsville are examined by the author, who was coordinator of the program for three of those years, to analyze what the best mix was for job success. Undergraduate physical science training and graduate specialization were important ingredients.

Professional geographers played a key role in the teaching. But, non-geographers were required to complete the offerings.

Recommendations are presented for an environmental studies graduate curriculum for geographers.

A Geography Program for Environmental Jobs

Environmental jobs will continue to employ a significant part of the workforce during the next decade, despite the cuts currently threatened by the President. The Council on Environmental Quality observed in its monumental tenth annual report that, in 1980, "Looking back on the decade, it is clear that the nation has faced itself in a new direction. . . . Embedded . . . in the nation's consciousness, is now the belief that no new project should be undertaken without first seriously considering its effects on the ecosystem. . . . The commitment to environmental progress has been made, and seems to be here to stay . . ."[1].

The question asked here is, how can a geography program be designed to qualify geographers for environmental jobs?

Background of Study

Isn't the need for geographers and their qualifications for environmental study well understood? After all, geographers have been concerned with man-land relationships since Anaximander drew up the first known map of the inhabited western world some 25 centuries ago.

Unfortunately, the place of geographic training for environmental problem solving is often poorly perceived, even by geographers. Laurence Wolf translates Hugh Millward from Geografiska Annaler as follows [2]:

> Perhaps the problem of our discipline is not that we are now in a period of which geographic research seems to be going off in all directions at once, but, rather, that our most competent research scholars do not seem to be able to anticipate, with rare exceptions, the emergent problems of societal and intellectual relevance. . . .

Certainly, the potentials of geography for environmental research is often ignored by non-geographers. Reed Stewart writes of his experience at a two-day conference on Technology for the Liberal Arts Major, held in 1980 at the Massachusetts Institute of Technology (MIT). "There were half-a-dozen presentations of majors, minors, and courses with the theme of Science, Technology, and Society . . . ," but he discovered, "the complete absence of geography as a discipline in the consciousness of the participant" [3].

On the other hand, geographers have long recognized the need for applied geography. Thus, in 1976, a special section for applied research was established by the Geographical Review, and in 1978 and 1979 issues of the Geographical Survey were devoted to applied geography papers. Applied geography conferences have become annual events and the subject has been a feature of annual meetings of the Association of American Geographers in recent years. All of the above is noted by Robert Britton in the Fall, 1980, issue of the Bulletin of the Illinois Geographical Society. Britton also argues that geographers should provide their valuable insights to the public [4]:

> It would be foolish to suggest that a heightened effort to bring geography to the public should be at the top of every geographer's agenda. A purely academic bent is perfectly defensible. It is, however, incumbent on those scholars who bemoan our poor or absent image and who call for a more active role to deliver their substantial and valuable knowledge to the attention of society.

And, even some non-geographers recognize that geographic training is especially suitable for environmental jobs. F. R. Fosberg, a botanist, in the March, 1976, Annals, writes that he sees geology as concerned principally with the detailed structure and history of the earth, earth processes and resultant geomorphologic patterns. The field of ecology, as he sees it, focuses on the interaction of single organisms, populations, or communities with their environments. The ecosystem is the central concept in ecological study -- the entire complex of interacting organic and physical factors. Geography he sees as more comprehensive and man-related. Geography works from the physical relationships to "the discernment and delineation of landscape patterns, interpreting the structures and processes that give rise to them and developing an understanding of their significance in biological and human terms, on the other." In this latter aspect, Fosberg comments, "Not only is it what you [geographers] do best, but it is of immense practical human importance. It is the basis for any broad-scale planning, and is the only possible guide for rational land utilization. Also, it is what geography can offer that is of great use to many other sciences. It often gives meaning to data developed in detail by these sciences and helps relate them to other subject matter and fields of investigation and thought" [5].

It appears, then, that a major reason that geography has not become more recognized in the market place for its environmental capabilities is a lack of perception rather than from a lack of capacity. Geography is a proper environmental tool, but, a neglected one. To be effective, however, the tool must be shaped to fit the task. Frederick Stutz points out that ". . . numerous articles have recently

appeared in The Professional Geographer and elsewhere stressing the importance of applied geography, both to help the field adapt itself and its students to a different job market and to aid in the solution of acute and pressing social and environmental problems. . . . The need to revamp curricula is clearly increasing, as students must now have practical experience and a firsthand knowledge of how theories and methodologies should be applied to help solve real-world problems" [6].

Lessons of an Environmental Studies Program

The following proposal for a geography program for environmental jobs is based upon three years experience, from 1977 to 1980, of the author as Coordinator of the Environmental Studies Program at Southern Illinois University at Edwardsville. He came into the job as a trained geographer with twelve years full-time teaching experience in geography and some seven years in applied geography as a regional economist with the Federal Reserve Bank of St. Louis.

Methodology

The findings of this study are based upon an analysis of the educational background and employment of graduates, or near-graduates, of the Southern Illinois University at Edwardsville program in Environmental Studies during the period from 1977 to 1980. Students are classified according to their undergraduate degree major, final research project, employment, and advisory committee members (Appendix, Tables A-1 and A-2). Analysis is then made according to characteristics of undergraduate majors (Table 1), composition of faculty committee members (Table 2), geographic specialties of faculty (Table 3),

and employment of students (Table 4). These findings are then related to proposals for a geography program based upon the author's experience as a geographer.

Limitations

This study is limited to a three year time period and deals entirely with the SIUE experience. While the universality of its findings is circumscribed by this limited focus, it is believed that the depth of experience somewhat compensates for its narrowness. Also, the analysis is confined to those students who were relatively successful (i.e., graduates or near-graduates) in the Environmental Studies Program. And, assumptions about the relationship or employment and education are made from the raw data in the Tables rather than from an in depth analysis of each case. Finally, there are some gaps in the base Tables, Appendix, Tables A-1 and A-2, because data was not available in the reports at hand. But, it is not believed that a 100 percent coverage would significantly affect the conclusions. The analysis rests heavily upon the experience and insights of the author and is subject to his bias as a program participant.

The Study

Southern Illinois University at Edwardsville is a relatively moderate sized (about 10,000 students) University, with about 80 percent of its students on a commuter basis. The Environmental Studies Program was begun in 1976.

Nature of the Environmental Studies Program

The Environmental Studies Program featured two plans of study for students: (1) a social science option, and (2) a technical (physical science) option. In both cases, students took a sequence of courses designed

to teach them the philosophy of the environmental approach to problems, major principles regarding the flow of energy through the ecosystem, and principles of the political-socio economy. Social science oriented students then followed a sequence of environmental assessment principles and procedures. Physical science oriented students followed a math-engineering-biology sequence. Students were required to sample courses in the option they had not elected, and to prepare final research papers based upon research in their elected specialty [7].

During the four years of its operation, up to 1980, new enrollments in the program totaled 162 [8]. This study covers 53 graduates or near-graduates, 33 percent of all students enrolled during this period.

The analysis now turns specifically to the Environmental Studies Program. As has been noted, both graduates and near-graduates of the program are included (See Appendix, Tables A-1 and A-2).

Undergraduate Major and Environmental Studies

Table 1 shows major categories of students by undergraduate major and relative numbers of students which achieved graduate or near-graduate status. Fifteen different categories of undergraduate majors were taken by Environmental Studies students. By far, the most, 38 percent, majored in biology. Eleven percent concentrated in chemistry. Six percent had majors in agricultural science, political science, liberal arts, and zoology (which, of course, might have been included under biology). The social sciences accounted for only about 25 percent of the students.

Thus, columns 5 and 6 show that of students completing the program during the three years, about three-fourths were physical scientists.

TABLE 1

CLASSIFICATION BY UNDERGRADUATE MAJOR OF GRADUATES AND NEAR-GRADUATES

ENVIRONMENTAL STUDIES PROGRAM, 1977-1980
SOUTHERN ILLINOIS UNIVERSITY AT EDWARDSVILLE

Undergraduate Major	Students			Percent	Students*	
	Graduates	Near-Grads	Total		Physical Sci	Social Sci
Agricultural Science	2	1	3	6	3	0
Anthropology	2	0	2	4	0	2
Biology	10	10	20	38	20	0
Business Administration	0	1	1	2	0	1
Chemistry	5	1	6	11	6	0
Design	0	1	1	2	0	1
Earth Science	0	1	1	2	1	0
Engineering	3	1	4	8	4	0
Govt and Political Science	0	3	3	6	0	3
Liberal Arts & Humanities	2	1	3	6	0	3
Management Science	1	0	1	2	0	1
Physics	1	1	2	4	2	0
Physical Education	0	1	1	2	0	1
Psychology	0	2	2	4	0	2
Zoology	2	1	3	6	3	0
TOTAL:	28	28	53	100**	39	14

**Includes other non-physical science.*
***Percentage does not add because or rounding.*

This was so despite the fact that the beginning of the school year admittance was regulated so that students were roughly balanced between social and physical science majors. No students listed had geography as their undergraduate major. Several geography majors were in the program but they later switched to a double major or to a degree in geography or planning and thus are not included in these Tables.

Faculty Participation

The discipline of members of the student's committees (which consisted of three persons) are shown by Table 2. The importance of Biology and Geography is somewhat overemphasized because during the first year of the program, the coordinator was a biologist, and in the following three, a geographer. The coordinator was called upon to heavily participate because of his position.

Of the 124 FTE participating faculty members over the four-year period, 39 percent were geographers. Engineering, biology, and chemistry faculty members participation ranged from 11 to 16 percent. Physics, government and anthropology had a participation around 5 percent. All other categories were less than 5 percent.

The specialties of Earth Science, Geography and Planning Department faculty who took part in the program, including not only those on the research project, but those teaching core courses as well, are shown in Table 3.

Four of the six teaching in the core courses were physical resource specialists.

TABLE 2

Faculty Participation by Discipline of Committee Members of Graduates and Near-Graduates

Environmental Studies Program, 1977-1980
Southern Illinois University at Edwardsville

Discipline	Graduates	Near-Grads	Total	Percent
Anthropology	2	3	5	4
Biology	6	9	15	12
Chemistry	9	5	14	11
Economics	0	1	1	1
Education	1	0	1	1
Engineering	17	3	20	16
Geography	32	16	48	39
Government	3	3	6	5
Management Science	1	0	1	1
Mathematics	2	0	2	2
Philosophy	1	0	1	1
Physics	4	2	6	5
Psychology	2	2	4	3
TOTAL:	80	44	124	100*

**Percentage does not add due to rounding*

NOTE: Names of 35 committee members were not provided in the data. Added to the 124 names provided equals 159, the total, had data been complete with 3 committee members for every one of the 53 students.

TABLE 3

Geographic Specialties of Faculty of Earth Science, Geography and Planning Department Participating in the Environmental Studies Program

Environmental Studies Program, 1977-1980 Southern Illinois University at Edwardsville

Geographic Specialty	Name of Faculty Member
Economic Geography	Kircher Thornton
Mineral Resources	Gore* Yarbrough
Soil	Wallace**
Water	Hess

Geologist
***Soil Scientist on Call Staff*

Employment

The employment status of the students is shown by Table 4. The striking fact is that 53 percent of the students were employed by private industry. The general assumption is that the majority of environmental jobs are government. (The second and fifth items in the table are combined for this figure.) By contrast, only one-fifth were employed by government. One-tenth continued with more schooling. Six percent went into teaching. Ten percent of the students were unemployed at the time surveyed.

Another striking fact is that the jobs held by all of the graduates appeared related to their graduate environmental education. But, only about 60 percent were related directly to their undergraduate major (see Appendix, Tables A-1 and A-2).

A Geography Program for Environmental Jobs

What meaning does the Environmental Studies Program experience have for designing a geography program that will help students obtain environmental jobs? The author believes that the following conclusions are justified:

(1) A graduate geography program for environmental jobs should have a major input of physical geography and/or other physical sciences. Those students who were most successful at Southern Illinois University at Edwardsville were those who had an undergraduate major in physical science. While approximately even numbers of students started out in the Environmental Studies Program at SIUE, those with physical science backgrounds were the most successful.

(2) A geography program for environmental jobs should include related disciplines in order to develop students' specialties.

TABLE 4

Employment Status of Graduates and Near-Graduates

Environmental Studies Program, 1980
Southern Illinois University at Edwardsville

Employment Status	Number of		Total	Percent
	Graduates	Near-Grads		
Advanced Research and Graduate Study	3	3	6	11
Environmental - Private	9	8	17	32
Environmental - Government	8	3	11	21
Teaching	2	1	3	6
Trade and Other Private	3	8	11	21
Unemployed	3	2	5	9
TOTALS:	28	25	53	100

One-third of the FTE's on the students' committees were contributed by geographers, indicating the capability of the discipline to prepare students. But, the other two-thirds were contributed by faculty in other disciplines who helped develop the specialty training of the student. And, the Environmental Studies Program was consistently related to jobs attained by students.

(3) A geography program for environmental jobs should be oriented to opportunities in the private sector, as well as in government. This means a realistic approach to environmental impacts and cost-benefit analysis and the appreciation of the benefits of productivity. A majority of the graduates and near-graduates of the SIUE Program found jobs in the private sector of the economy.

In conclusion, geography programs can deliver graduates tailored for jobs in the environmental job market. But, the programs should include ample cross-fertilization with other disciplines and teaching about the physical geographic base. Finally, the program should not overlook the private sector of the market. The jobs are there if we prepare!

- * -

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Harry B. Kircher 3-31-81

Short Vita

Dr. Kircher is a Professor of Geography and Chairman of the Department of Earth Science, Geography and Planning at Southern Illinois University at Edwardsville.

He obtained degrees from the University of North Carolina, Washington University and Clark University, Worcester, Massachusetts. He was an officer manager and associate editor with a privately owned farm cooperative in North Carolina and a regional economist with the Federal Reserve Bank of St. Louis, before coming to Southern Illinois University at Edwardsville.

He has published numerous articles and is principal author of a book on Natural Resources, now to appear in its 5th edition, which has sold in 38 states.

Besides professional affiliations and citizen advisory participation on a number of local and state organizations, he has been active in numerous conservation related societies.

He has lived with his wife, Ede, and daughter, Susan, in Edwardsville for the past 15 years. His family roots in Illinois go back to 1833.

APPENDIX

TABLE A-1

EDUCATION AND EMPLOYMENT - GRADUATES - ENVIRONMENTAL STUDIES PROGRAM - SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE, ILL.

1977 - 1980

EDUCATION UNDERGRADUATE DEGREE	FINAL RESEARCH PROJECT	EMPLOYMENT	RELATED TO DEGREE UNDERGRADUATE	RELATED TO DEGREE GRADUATE	COMMITTEE MEMBERS		
Chemistry	Solar Efficiency Study at SIUE Ill.	Environmental	No	Yes	Eng.	Eng.	Geog.
Chemistry		Unemployed			Gort.	Geog	Eng.
Humanities	Impact Assessment of Sludge Util.	Environmental	No	Yes	Geog.	Geog.	Eng.
Agrculture Science	Examination of Sweet Saphumas	Environmental	Yes	Yes	Bio	Geog	Eng
Management Science	Polluten Exterralities	Trade and Others	Yes	Yes		Geog	Mgmt
Zoology		Environmental			Eng	Geog	Eng
Biology	Flood Relic/Subdivision, Ill.	Teacher-Science	No	Yes	Phys	Phys	Geog.
Biology		Trade and Others			Chem	Geog	Phys
Agriculture	They wrtoe it all down, prog. man	Environmental	Yes	Yes	Bio	Geog	Geog
Engineering	A study of Air Pollution	Environmental	Yes	Yes	Eng	Geog	Psy
Biology	Projected Energy, Edwardsville, Il.	Unemployed			Math	Geog	Geog
Chemistry	Pulmonary Function Study	Adv. Research	Yes	Yes	Chem	Chem	Geog
Zoology	Energy, Policy and Planning	Environmental	No	Yes	Phys	Geog	Geog
Engineering		Environmental			Eng	Eng	Chem
Physics	Retrofitting of Homes	Adv. Research	Yes	Yes	Eng.	Geog	Math
Anthropology	The Effects of Land use	Environmental	Yes	Yes	Bio	Anthr	Geog
Biology	Basic Math and Certification	Environmental	No	Yes	Geog	Eng	Geog
Humanities	Garry Commoner Environmental Cris.	Trade and others	No	Yes	Bio	Geog	Phil
Biology	Asbestos Environmental Health	Environmental	Yes	Yes	Chem	Geog	Eng
Biology	An Economic Assessment Report	Adv Research	No	Yes	Geog	Geog	Psy
Chemistry	Effect of Floundem Phosphonous	Unemployed	Yes	Yes	Chem	Geog	Chem
Biochemistry	Applied Studies Program	Environmental	Yes	Yes			
Biology	Remoted Biological Habitation	Environmental	Yes	Yes	Geog	Geog	Geog
Anthropology	Environmental Studies Survey	Environmental	Yes	Yes	Geog	Bio	Anth
Biology		Teacher,Science			Educ	Bio	Geog
Microbiology		Environmental			Chem	Eng	Geog
Biology	Effects of Powdered Carbon, Bas	Environmental	No	Yes	Eng	Eng	Govt
Engineering	Emergency Oil Spill Techniques	Environmental	Yes	Yes	Gov	Eng	Gem

*Theses tables were prepared with the help of SIUE graduate students Joan Harris and Richard Nicol. Information was gathered from the Environmental Studies Newsletter (9) and reports by the coordinator.

TABLE A-11

EDUCATION AND EMPLOYMENT - GRADUATES - ENVIRONMENTAL STUDIES PROGRAM - SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE, ILL.

1977 - 1980

EDUCATION UNDERGRADUATE DEGREE	FINAL RESEARCH PROJECT	EMPLOYMENT	RELATED TO DEGREE UNDERGRADUATE	RELATED TO DEGREE GRADUATE	COMMITTEE MEMBERS		
Physical Education	Environmental Education	Teacher	No	Yes			
Psychology		Trade & Others					
Government		Environment			Geog	Psy	Govt
Biology	Nuclear Power in Illinois	Environment	Yes	Yes	Phys		
Political Science	Water Pollution Control	Environment	Yes	Yes	Geog	Govt	Geog
Biology	Role of Zooplankton	Research Asst	Yes	Yes	Bio	Bio	Geog
Political Science	Housting Study in E. St Louis	Trade & Others					
Engineering	Managing a Small Woodland	Unemployed	Yes	Yes			
Design	Profitability of small Plants	Environment	No	Yes			
Liberal Arts		Trade & Others			Bio	Bio	
Biology	Effect of Resource Cons and Rec.	Environment	Yes	Yes	Chem	Geog	Psy
Biology	Hazardous Waste	Environment	Yes	Yes			
Zoology	Multiple Persptective	Trade & Others	No	Yes			
Psychology	Prehistoric Environmental Reconst	Trade and Others	Yes	Yes	Anth	Geog	Bio
Biology	Study of Zooplankton	Trade and Others	Yes	Yes	Bio	CHem	
Physics	Technical Aspects of Electric.	Trade and Others	Yes	Yes	Phys		
Biology	Intermittend Sand Filtration	Environment	Yes	Yes	Geog	Govt	Geog
Business Admin.	Cost Benefit Analysis of Pollution	Adv Research	Yes	Yes	Eng	Geog	
Biology	Ozone & Liquid Oxygen Qualific.	Unemployed	Yes	Yes	Eng	Chem	
Biology	Prehistoric Aquatic Resources	Environment	Yes	Yes	Anth		
Biology	Groundwater	Environment	Yes	Yes	Bio	Geog	
Earth Science	Stream Alteration	Adv Research	Yes	Yes	Geog	Bio	Geog
Chemistry		Envrionment			Chem		
Agriculture Science	Goundwater Newa Ft Leonard MO	Environment	Yes	Yes	Geog	Econ	Chem
Biology	Goundwater Recovery	Environment	Yes	Yes	Geog	Econ	Chem

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